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Geotechnical Laboratory  
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Oak Ridge TN 37830  
(865) 482-6497

## CERTIFICATE OF ANALYSIS

Stephen Trent  
Fluor Hanford, Inc.  
825 Jadwin Avenue  
Richland, Washington 99352

January 6, 2005

This is the Certificate of Analysis for the following samples:

Shaw Project ID:	Eberline - Hanford
Shaw Project Number:	100846.35000000
Client Sample Data Group:	H2842
Date Received by Lab:	November 23, 2004
Number of Samples:	Two (2)
Sample Type:	Soil

**RECEIVED**  
AUG 22 2005  
**EDMC**

### I. Introduction/Case Narrative

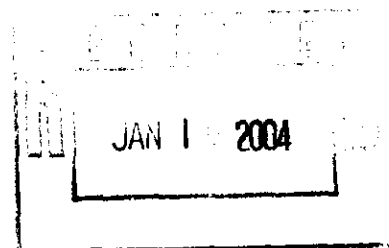
Two soil samples were received by the Shaw Geotechnical Laboratory on November 23, 2004. The samples were submitted for determination of moisture content, bulk density, and sieve analysis. The sample numbers received were B191C2 and B191C3.

Please see Appendix A, Sample Number Cross Reference List; Appendix B, Analysis Results; and Appendix C, Chain-of-Custody/Sample Receipt Records.

"I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature."

Reviewed and Approved:

Ralph Cole  
Laboratory Manager, Geotechnical Services



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## II. Analytical Results/Methodology

REFERENCES: United States Army Corps of Engineers (USACE), Engineer Manual 1110-2-1906, *Laboratory Soils Testing*, appendix II, 1970; United States Environmental Protection Agency, SW846, *Test Methods for Examining Solid Waste, Physical/Chemical Methods*, 3rd ed., Nov 1986 (EPA SW-846). Annual Book of ASTM Standards, Section 4, Construction, Volume 04.08, *Soil and Rock (I)*, and Volume 04.09, *Soil and Rock (II)*, 2004. Shaw Environmental and infrastructure, Standard Operating Procedures.

Moisture Content of Soil and Rock..... **ASTM D 2216**  
Bulk Density of Soils..... **EM 1110-2-1906**  
Particle-size Analysis of Soils ..... **ASTM D 422**

## III. Quality Control

Quality control checks such as duplicates and spikes (QC samples), are not normally applicable to geotechnical testing. This is due largely to the inability of obtaining samples with known characteristics, the heterogenous nature of the samples, and quality control procedures built-in to the analytical method.

QC measures to ensure accuracy and precision of test results include the following:

- 100% verification of all numerical results - raw data entries, transcriptions and calculations entered by lab technicians are checked, recalculated and verified. Most data calculations are performed by computer programs.
- Data validation through test reasonableness - summaries of all test results for individual reports are reviewed to determine the overall reasonableness of data and to determine the presence of any data that may be considered outliers.
- Quality control procedures are built into most standardized geotechnical procedures. For example, liquid limit and plastic limit analyses call for re-analyses and specify acceptance criteria.
- Routine instrument calibration - instruments, gauges and equipment used in testing are calibrated on a routine basis. All instrument calibration follows ASTM or manufacturer guidelines.
- Maintenance of all past calibration records - calibration records and certification documents of all instruments, gauges and equipment are updated routinely and maintained in the Quality Control Coordinators Quality/Operations files.

- Certified and trained personnel - all technicians are certified by the National Institute for Certification of Engineering Technicians (NICET) in geotechnical soil testing, and are trained in the application of standard laboratory procedures for geotechnical analyses as well as the quality assurance measures implemented by Shaw.
- Quantitative analyses frequently used in geotechnical/physical testing programs do not use QC tools common to wet chemistry or radiochemistry laboratories. Measures not employed in the analysis of samples reported in this report include: laboratory control samples (LCS), blanks, matrix spikes (MS), duplicate analyses, dilutions, digestions, correction factors, surrogate sample analyses, detection limit determinations, control charts, and/or tentatively identified compounds (TICs).

#### IV. Data Qualification

None.

**Appendix A**  
**Sample Cross-Reference List**

Page 4 of 11  
January 6, 2005  
Stephen Trent  
Fluor Hanford, Inc.  
Shaw Project Name: Eberline Hanford  
Shaw Project No. 100846.35000000  
SDG No. H2842

**Shaw Geotechnical  
Laboratory  
Oak Ridge TN  
(865) 482-6497**

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**SAMPLE NUMBER CROSS-REFERENCE LIST**

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LAB SAMPLE NO.	CLIENT SAMPLE NO.	MATRIX
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BC0473 .....	B191C2 .....	Soil
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BC0474 .....	B191C3 .....	Soil
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**Appendix B**  
**Sample Test Results**

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**PARTICLE-SIZE DISTRIBUTION  
 ASTM D 422**

Project Name Eberline Hanford

Field Sample No. B191C2

Project No. 100846.35000000

Lab Sample No. BC0473

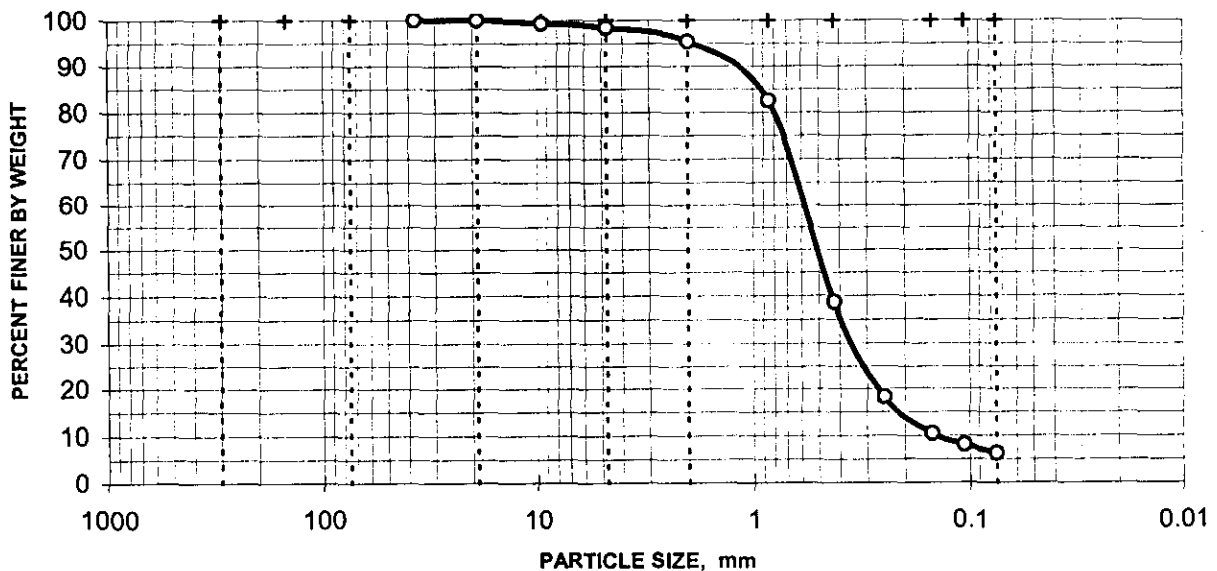
Moisture Content = 3.4%  
 based on dry sample weight

**SIEVE ANALYSIS**

C O A R S E	Sieve No.	Diameter mm	Percent Finer
	3"	75.000	100.0%
	1.5"	37.500	100.0%
	0.75"	19.000	100.0%
	0.375"	9.500	99.3%
	#4	4.750	98.4%
	#10	2.000	95.4%

F I N E	Sieve No.	Diameter mm	Percent Finer
	#20	0.850	82.5%
	#40	0.425	38.7%
	#60	0.250	18.2%
	#100	0.149	10.4%
	#140	0.106	8.1%
	#200	0.075	6.2%

**DISTRIBUTION CURVE**



1.6% Gravel

92.2% Sand

6.2% Silt/Clay

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## PARTICLE-SIZE DISTRIBUTION ASTM D 422

Project Name Eberline Hanford

Field Sample No. B191C3

Project No. 100846.35000000

Lab Sample No. BC0474

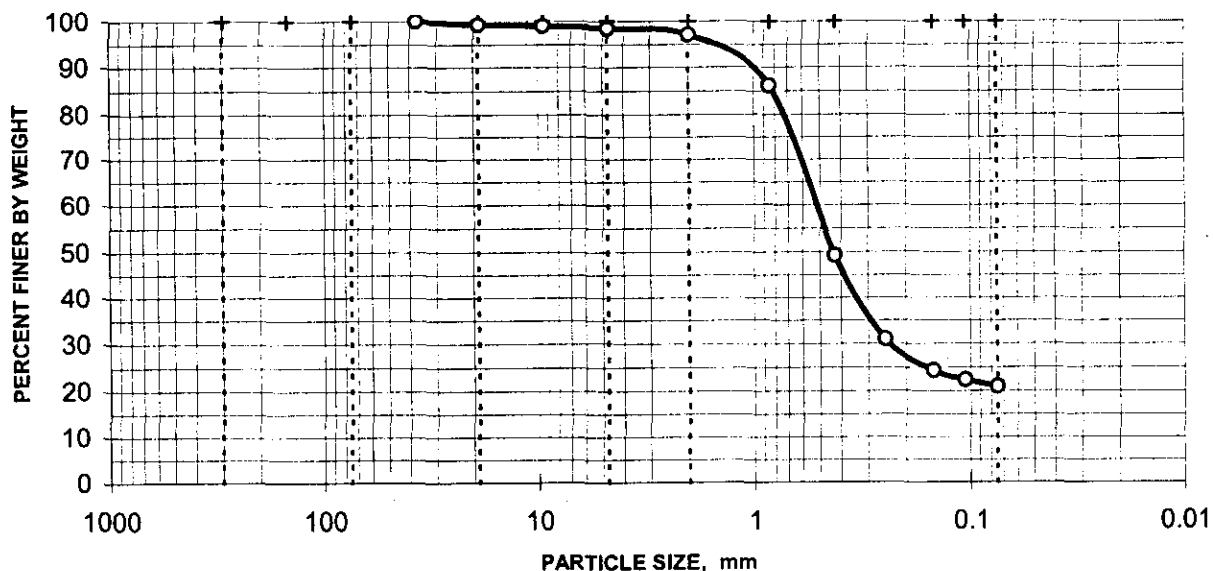
Moisture Content = 3.0%  
 based on dry sample weight

### SIEVE ANALYSIS

C O A R S E	Sieve No.	Diameter mm	Percent Finer
	3"	75.000	100.0%
	1.5"	37.500	100.0%
	0.75"	19.000	99.2%
	0.375"	9.500	99.0%
	#4	4.750	98.4%
	#10	2.000	97.1%

F I N E	Sieve No.	Diameter mm	Percent Finer
	#20	0.850	86.2%
	#40	0.425	49.2%
	#60	0.250	31.0%
	#100	0.149	24.3%
	#140	0.106	22.4%
	#200	0.075	20.9%

### DISTRIBUTION CURVE



1.6% Gravel

77.5% Sand

20.9% Silt/Clay

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**Appendix C**  
**Chain-of-Custody and Request-for-Analysis Records**

FLUOR Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST						F03-025-079	PAGE 1	OF 1	
COLLECTOR Pope/Pfister/Wilberg/Tyra		COMPANY CONTACT TRENT, STEVE		TELEPHONE NO. 373-5689		PROJECT COORDINATOR TRENT, SJ		PRICE CODE 8N	DATA TURNAROUND 45 Days / 45 Days		
SAMPLING LOCATION 216-T-28; 67.5ft-70ft		PROJECT DESIGNATION 200-LW-1/LW-2 Characterization - Soil				SAF NO. F03-025		AIR QUALITY			
ICE CHEST NO. <i>GMP-03-016</i>		FIELD LOGBOOK NO. HNF-N-356 1		COA 119143E510		METHOD OF SHIPMENT Federal Express					
SHIPPED TO Shaw Group		OFFSITE PROPERTY NO. <i>Su PTK 14450</i>				BILL OF LADING/AIR BILL NO. <i>Su PTK 14450</i>					
MATRIX* A=Air DL=Drum Liquids DS=Drum Solids L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	POSSIBLE SAMPLE HAZARDS/ REMARKS N/A  <i>SDG # 42842</i>		PRESERVATION None		None						
			TYPE OF CONTAINER		Moisture Resistant Cont						
			NO. OF CONTAINER(S)		1						
			VOLUME		200mL						
SPECIAL HANDLING AND/OR STORAGE <i>N/A TMS 11-04</i> <i>Radiocesium Tile to B19101</i>			SAMPLE ANALYSIS		Moisture Content - D2216;		SEE ITEM (1) IN SPECIAL INSTRUCTIONS				
SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME								
B191C2	SOIL	<i>11/11/04</i>	<i>1320</i>	X	X						
BC 0473											
CHAIN OF POSSESSION				SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS					
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BY/STORED IN		DATE/TIME					
<i>Dave Pope/David Tyra</i>		<i>11-11-04 1445</i>		<i>MO-0210, FRIG#1</i>		<i>11-11-04 1445</i>					
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BY/STORED IN		DATE/TIME					
<i>Mr. J.C. KITT</i>		<i>11/13/04 0835</i>		<i>MA. F. Schuler/G. Schuler</i>		<i>11/13/04 0835</i>					
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BY/STORED IN		DATE/TIME					
<i>H.H. Barlow/M.A. Durbin</i>		<i>11/15/04 0835</i>		<i>Fred Ex</i>							
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BY/STORED IN		DATE/TIME					
<i>Fred Ex #</i>		<i>11/18/04 10:00</i>		<i>Lynne M. Seay SEA-2</i>		<i>11/18/04 10:00</i>					
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BY/STORED IN		DATE/TIME					
<i>And Sam</i>		<i>11/22/04 3:30</i>		<i>Fred Ex</i>		<i>11/22/04</i>					
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BY/STORED IN		DATE/TIME					
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BY/STORED IN		DATE/TIME					
LABORATORY SECTION	RECEIVED BY <i>Jalulu SHAW ENVIRONMENTAL</i>			TITLE <i>10</i>	DATE/TIME <i>11/23/04 @ 1000</i>						
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD			DISPOSED BY		DATE/TIME					

FLUOR Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				F03-025-080		PAGE 1 OF 1		
COLLECTOR Pope/Pfister/Wiberg/Tyra		COMPANY CONTACT TRENT, STEVE		TELEPHONE NO. 373-5689		PROJECT COORDINATOR TRENT, SJ		PRICE CODE 8N DATA TURNAROUND 45 Days / 45 Days		
SAMPLING LOCATION 216-T-28; 90.0ft-92.5ft		PROJECT DESIGNATION 200-LW-1/LW-2 Characterization - Soil		SAF NO. F03-025		AIR QUALITY <input type="checkbox"/>				
ICE CHEST NO. <b>GRR-03-26</b>		FIELD LOGBOOK NO. HNF-N-356 1		COA 119143ES10		METHOD OF SHIPMENT Federal Express				
SHIPPED TO Shaw Group		OFFSITE PROPERTY NO. <b>See PTR 14450</b>				BILL OF LADING/AIRBILL NO. <b>See PTR 14450</b>				
MATRIX* A=Air DL=Drum Liquids DS=Drum Solids L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	POSSIBLE SAMPLE HAZARDS/ REMARKS N/A  <b>SDG# H2842</b>		PRESERVATION		None	None				
			TYPE OF CONTAINER		Moisture Resistant Cont	Liner				
			NO. OF CONTAINER(S)		1	1				
			VOLUME		200mL	1000mL				
	SPECIAL HANDLING AND/OR STORAGE <b>Radioactive Tie to: B191C3</b>		SAMPLE ANALYSIS		Moisture Content - D2216;	SEE ITEM (1) IN SPECIAL INSTRUCTIONS				
SAMPLE NO.		MATRIX*		SAMPLE DATE	SAMPLE TIME					
B191C3		SOIL		11-15-04	0755					
BC 0474										
CHAIN OF POSSESSION				SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS				
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BYT/STORED IN		DATE/TIME		(1) Particle Size (Dry Sieve) - D422; Bulk Density - D2937;  <b>To Shaw Lab</b>		
J. Pope / 11/15/04		11:00		MO-026 / REF # 3		11/15/04 11:00				
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BYT/STORED IN		DATE/TIME				
MO-026 / 11/17/04		0822		M.H. Bucher / M.H. Bucher		11/17/04 0822				
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BYT/STORED IN		DATE/TIME				
M.H. Bucher / 11/17/04		0822		Fed Ex						
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BYT/STORED IN		DATE/TIME				
Fed - Exp		11/18/04 10:00		Kyananoto SA-2		11/18/04 10:00				
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BYT/STORED IN		DATE/TIME				
Fred Jones		11/22/04 3:30		Fed Ex		11/22/04				
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BYT/STORED IN		DATE/TIME				
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BYT/STORED IN		DATE/TIME				
LABORATORY SECTION		RECEIVED BY <b>Shaw Envir.</b>				TITLE		DATE/TIME 11/23/04 @ 1000		
FINAL SAMPLE DISPOSITION		DISPOSAL METHOD				DISPOSED BY		DATE/TIME		

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SDG # H2842

PAGE 1

Eberline Svcs

CHAIN OF CUSTODY

ORD # R4-11-171

11/19/04 10:22:58

WORK ID: SAF# F03-025 SDG H2842

RCVD: 11/18/04 DUE: 01/02/05

KEEP: 01/02/06

DISP: S

DASH	SAMPLE IDENTIFICATION	STORED	TESTS
01A-S	B191C2	SHAW	DISPOS E331S E333S E335S
*****			
02A-S	B191C3	SHAW	DISPOS E331S E333S E335S
=====			

BC 0473

BC 0474

RELEASED BY	DATE	TRANSFERRED TO	DATE	RECEIVED BY	DATE
<u>John Davis</u>	<u>11/22/04</u>	<u>Shaw</u>	<u>11/22/04</u>	<u>Robert</u>	<u>11/23/04</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

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